

Amendments to the Drawings:

The attached drawing sheets include changes to Figures 3A and 3B. Both in Figure 3A and 3B, the word PLANNING has been deleted from box 210.

Attachment: Annotated Sheets Showing Changes
Replacement Sheets

REMARKS

Applicant respectfully requests reconsideration of this application in view of the following remarks. For the Examiner's convenience and reference, Applicant's remarks are presented in substantially the same order in which the corresponding issues were raised in the Office Action.

Status of the Claims

Claims 2, 5-14, 16-17, 19, 22-34, and 37-76 are pending. Claims 2, 5, 6, 8-10, 12-14, 16-17, 19, 22-25, 27, and 29-34 are currently amended to more clearly define pre-existing claim limitations. Claims 1, 3, 4, 15, 18, 20, 21, 35 and 36 are canceled. Claims 37-76 are added. No new matter has been added.

Summary of the Office Action

Claims 2, 16-17, 23, 31, 32, and 34 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application No. 2002/0193685 to Mate et al. (hereinafter "Mate")

Claim 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mate.

Claims 6-12, 22, and 24-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mate in view of U.S. Patent No. 4,452,252 to Sackner (hereinafter "Sackner").

Claims 13, 14, 29, and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mate in view of Sackner, and further in view of U.S. Patent No. 5,901,199 to Murphy et al. (hereinafter "Murphy").

Claims 19, and 30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mate in view of U.S. Patent No. 6,314,312 to Wessels et al. (hereinafter "Wessels").

Response to Rejections under 35 U.S.C. § 102(e) & §103(a)

The Office Action rejected claims 2, 16-17, 23, 31, 32, and 34 under 35 U.S.C. § 102(e) as being anticipated by Mate. Also, the Office Action rejected claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Mate. Applicant respectfully requests

withdrawal of these rejections because the cited reference fails to disclose all of the limitations of the claims.

CLAIMS 2, 5-14, AND 16-17

Claims 2, 6-14, and 16-17 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Mate. Claim 5 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Mate in view of purported skill in the art. Applicant respectfully requests withdrawal of these rejections because the combination of cited references fails to teach or suggest all of the limitations of the claims. Independent claim 5 recites, in pertinent part:

establishing a look-up table of positional data for said composite motion of said data, by imaging said target and said surrounding region while the target undergoes said composite motion;

establishing a look-up table of **cardiac motion data for a succession of points along a heartbeat cycle of said patient**, by imaging said target and said surrounding region while the patient is holding his breath; (emphasis added)

Applicant respectfully disagrees with the Office Action's characterization of the prior art and submits that the cited combination of prior art fails to teach or suggest all of the limitations of the claim. In particular, Mate does not disclose establishing a look-up table of **cardiac motion data for a succession of points along a heartbeat cycle of said patient**, by imaging said target and said surrounding region while the patient is holding his breath.

Mate is directed to a target locating and monitoring system that utilizes radio-frequency (RF) markers positionable in or near the target, an external excitation source that remotely excites the markers to produce an identifiable RF signal, and a plurality of RF sensors spaced apart in a known geometry relative to each other to detect the RF signal. (Mate, Abstract.) The RF markers of Mate move because of a combination of motions, such as contributions from breathing, organ filling or emptying, or other internal motions. (Mate, page 1, para. 10, page 2, para. 13). Using the RF sensor, the monitoring system of Mate detects only the resulting position of the RF markers caused by a combination of motions, such as breathing, organ filling or emptying, or other internal motions. (Mate, page 1, para. 10). However, nothing in Mate discloses that the different

types of contributing motions are separately determined. Rather, Mate only discloses determining the actual position of the RF marker, due to the composite motion.

Moreover, even though the Office Action indicates that it would be obvious to one of ordinary skill in the art to use a look-up table to provide easy access for the data processing unit, the combination of a look-up table with the teachings of Mate does not disclose the limitation of “establishing a look-up table of cardiac motion data” because regardless of whether data is stored in a look-up table or not in Mate, Mate only discloses determining the actual position of the markers due to the composite motion, and not cardiac motion data.

In contrast, claim 5 recites “establishing a look-up table of **cardiac motion data for a succession of points along a heartbeat cycle of said patient**, by imaging said target and said surrounding region while the patient is holding his breath.” For the reasons stated above, Mate fails to disclose all of the limitations of claim 5. In particular, Mate does not disclose establishing a look-up table of cardiac motion data for a succession of points along a heartbeat cycle of said patient, by imaging said target and said surrounding region while the patient is holding his breath. Given that the cited reference fails to disclose all of the limitations of the claim, Applicant respectfully submits that claim 5 is patentable over the cited reference. Accordingly, Applicant requests that the rejection of claim 5 under 35 U.S.C. § 103(a) be withdrawn.

Given that claims 2, 6-14, and 16-17 depend from independent claim 5, which is patentable over the cited reference, Applicant respectfully submits that dependent claims 2, 6-14, and 16-17 are also patentable over the cited reference. Accordingly, Applicant requests that the rejection of claims 2 and 16-17 under 35 U.S.C. § 102(e) and the rejection of claims 6-14 under 35 U.S.C. § 103(a) be withdrawn.

CLAIM 19

Claim 19 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Mate in view of Wessels. Applicant respectfully submits that independent claim 19 is patentable over the cited reference because the combination does not teach or suggest all of the limitations of the claim. Independent claim 19 recites, in pertinent part:

A method of treating a moving target in a patient by applying one or more radiosurgical beams, generated from a radiosurgical beam source, to said target, the method comprising:

... wherein said motion of said target is caused by the respiration and the heart beat of said patient; and wherein the adjusting said relative position of said radiosurgical beam source to account for the difference in target position comprises:

sensing the motion of said target during a time interval, using a breathing sensor and a heart beat sensor; (Emphasis added).

Applicant respectfully disagrees with the Office Action's characterization of the prior art and submits that the cited combination of prior art fails to teach or suggest all of the limitations of the claim. In particular, Mate does not disclose **sensing the motion of said target during a time interval, using a breathing sensor and a heart beat sensor.**

Mate is directed to a target locating and monitoring system that utilizes radio-frequency (RF) markers positionable in or near the target. An external excitation source that remotely excites the markers is used to produce an identifiable RF signal. Multiple RF sensors spaced apart in a known geometry relative to each other are used to detect the RF signal. (Mate, Abstract.) The RF markers of Mate move because of a combination of motions, such as contributions from breathing, organ filling or emptying, or other internal motions. (Mate, page 1, para. 10, page 2, para. 13). Mate only discloses determining the actual position of the RF marker using the RF sensor. (Mate, page 1, para. 10). Nothing in Mate discloses the use of a breathing sensor or a heart beat sensor.

Wessels is directed to a system for determining movement of an organ of a patient. Wessels, however, fails to cure the deficiency described above with respect to Mate, and does not disclose "sensing the motion of said target during a time interval, using a breathing sensor and a heart beat sensor."

In contrast, claim 19 recites "**sensing the motion of said target during a time interval, using a breathing sensor and a heart beat sensor.**" For the reasons stated above, Mate and Wessels, either alone or in combination, fail to teach or suggest all of the limitations of the claim. In particular, the cited references do not teach or suggest sensing the motion of said target during a time interval, using a breathing sensor and a heart beat sensor. Given that the cited references fail to disclose all of the limitations of the claim, Applicant respectfully submits that claim 19 is patentable over the cited

references. Applicant requests that the rejection of claim 19 under 35 U.S.C. § 103(a) be withdrawn.

CLAIMS 22-34

Claim 23, 31, 32, and 34 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Mate. Also, claims 22, 24-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mate in view of Sackner. Applicants respectfully submit that one of skill in the art would not be motivated to combine Mate and Sackner. Independent claim 22 recites, in pertinent part:

A system for treating a moving target in a patient by forming a radiosurgical lesion on said target, the system comprising:

...

means for generating from said at least one signal at least one correction factor that is effective, when applied to said positioning system, to modify the position of said beam source relative to said target to accommodate for the difference in position of said target at a current time as compared to the position of said target in said pre-operative diagnostic image;

a signal processor coupled to the processor, the signal processor to process said at least one signal to generate a first signal substantially characterized by a first frequency, and a second signal substantially characterized by a second frequency;

means for generating from said first signal a first correction factor, and for generating from said second signal a second correction factor; (Emphasis added).

In support of the rejection, the Office Action states, in part:

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the separation techniques of Sackner to make corrections and reduce noise in the system of Mate et al. in order to simplify the calculations needed to determine the correction factors. (Office Action, October 5, 2005, 4-5).

Sackner is directed to a method for monitoring cardiopulmonary parameters. The method of Sackner uses a single transducer element to monitor both cardiac and pulmonary parameters. The pulmonary parameters may include snoring, coughing, apneas, swallows, etc., and the cardiac parameters may include respiration rate, and inspiration and expiration times. (Sackner, col. 1, line 64 to col. 2, line 1.) These events produce characteristic deflections or patterns which are monitored by the transducer to

effect level detection, rate detection or pattern recognition. (Sackner, col. 2, lines 1-5). Even though Sackner discloses separating a signal into two separate signals, the initial signal includes information representative of the deflection or patterns of the changes in cross-sectional area of the neck, not representative of motion. Similarly, the two separate signals are representative of cardiac and pulmonary parameters, such as pulse rate and breathing rate, and are not representative of motion of the target. In other words, the initial signal output from the transducer (coil 14) of Sackner, and the two split signals generated from the initial signal do not represent motion, but the level, rate, and pattern of deflections in the neck due to the carotid pulse and pulmonary events, such as snoring, coughing, apneas, and swallows.

As previously described, Mate detects only the resulting position of the RF markers caused by a combination of motions, such as breathing, organ filling or emptying, or other internal motions. (Mate, page 1, para. 10). As such, one of ordinary skill in the art would not be motivated to combine the separation techniques disclosed in Sackner with the monitoring system of Mate, because Sackner merely discloses the splitting of a signal, which indicates level, rate, and pattern of changes or deflections in the cross-sectional area of the neck, and not splitting a composite signal of motion into two separate signals.

In contrast, claim 22 recites “a signal processor coupled to the processor, the signal processor to process said at least one signal to generate a first signal substantially characterized by a first frequency, and a second signal substantially characterized by a second frequency.” For the reasons stated above, Mate and Sackner, either alone or in combination, fail to teach or suggest all of the limitations of the claim. In particular, the cited references do not teach or suggest a signal processor coupled to the processor, the signal processor to process said at least one signal to generate a first signal substantially characterized by a first frequency, and a second signal substantially characterized by a second frequency. Given that the cited references fail to disclose all of the limitations of the claim, Applicant respectfully submits that claim 22 is patentable over the cited references.

Given that claims 23-34 depend from independent claim 22, which is patentable over the cited references, Applicant respectfully submits that dependent claims 23-34 are

also patentable over the cited references. Accordingly, Applicant requests that the rejection of claims 23, 31, and 32 under 35 U.S.C. § 102(e) and the rejection of claims 22, and 24-30, and 33 under 35 U.S.C. § 103(a) be withdrawn.

CLAIMS 37-59

Applicant respectfully submits that independent claim 37 is patentable over the cited reference because Mate does not disclose all of the limitations of the claim.

Independent claim 37 recites:

A method, comprising:

determining a pulsating motion of a patient separately from a determining of a respiratory motion; and

directing a radiosurgical beam, from a radiosurgical beam source, to a target in the patient based on the determining of the pulsating motion. (Emphasis added).

Mate is directed to a target locating and monitoring system that utilizes radio-frequency (RF) markers positionable in or near the target. An external excitation source that remotely excites the markers is used to produce an identifiable RF signal. Multiple RF sensors spaced apart in a known geometry relative to each other are used to detect the RF signal. (Mate, Abstract.) The RF markers of Mate move because of a combination of motions, such as contributions from breathing, organ filling or emptying, or other internal motions. (Mate, page 1, para. 10, page 2, para. 13). Using the RF sensor, the monitoring system of Mate detects only the resulting position of the RF markers caused by a combination of motions, such as breathing, organ filling or emptying, or other internal motions. (Mate, page 1, para. 10). In particular, the RF sensor used in the system of Mate cannot distinguish between movement of the RF markers due to the respiratory motion and movement of the markers due to cardiac motion. Nothing in Mate discloses that the different types of contributing motions are separately detected.

In contrast, claim 37 recites "**determining a pulsating motion of a patient separately from a determining of a respiratory motion.**" For the reasons stated above, Mate fails to disclose all of the limitations of claim 37. In particular, Mate does not disclose determining a pulsating motion of a patient separately from a determining of a respiratory motion. Moreover, the other cited references herein fail to cure the deficiencies noted above with respect to Mate. Given that the cited references fail to

disclose all of the limitations of the claim, Applicant respectfully submits that claim 37 is patentable over the cited references.

Given that claims 38-59 depend from independent claim 37, which is patentable over the cited references, Applicant respectfully submits that dependent claims 38-59 are also patentable over the cited reference.

CLAIMS 60-74

Applicant respectfully submits that independent claim 59 is patentable over the cited reference because Mate does not disclose all of the limitations of the claim.

Independent claim 59 recites:

A system, comprising:

a pulsation measurement device to detect a pulsating cycle of a patient;

a radiosurgical beam source to direct a radiosurgical beam, from the radiosurgical beam source, to a target in a patient; and

a controller coupled to the radiosurgical beam source, wherein the controller is coupled to receive a signal from the pulsation measurement device representative of the pulsating cycle and to determine a pulsating motion of the patient based on the pulsating motion, and wherein the controller is configured to position the radiosurgical beam source to direct the radiosurgical beam using the pulsating motion. (Emphasis added).

Mate is directed to a target locating and monitoring system that utilizes radio-frequency (RF) markers positionable in or near the target. An external excitation source that remotely excites the markers is used to produce an identifiable RF signal. Multiple RF sensors spaced apart in a known geometry relative to each other are used to detect the RF signal. (Mate, Abstract.) The RF markers of Mate move because of a combination of motions, such as contributions from breathing, organ filling or emptying, or other internal motions. (Mate, page 1, para. 10, page 2, para. 13). Mate only discloses determining the actual position of the RF marker using the RF sensor. (Mate, page 1, para. 10). Nothing in Mate discloses the use of a pulsation measurement device.

In contrast, claim 59 recites “a pulsation measurement device to detect a pulsating cycle of a patient.” For the reasons stated above, Mate fails to disclose all of the limitations of claim 59. In particular, Mate does not disclose a pulsation measurement device to detect a pulsating cycle of a patient. Moreover, the other cited references herein

fail to cure the deficiencies noted above with respect to Mate. Given that the cited reference fails to disclose all of the limitations of the claim, Applicant respectfully submits that claim 59 is patentable over the cited reference.

Given that claims 60-74 depend from independent claim 59, which is patentable over the cited reference, Applicant respectfully submits that dependent claims 60-74 are also patentable over the cited reference.

CLAIMS 75-78

Applicant respectfully submits that independent claim 75 is patentable over the cited reference because Mate does not disclose all of the limitations of the claim.

Independent claim 75 recites:

An apparatus, comprising:

a radiosurgical beam source to direct a radiosurgical beam, from the radiosurgical beam source, to a target in a patient

means for determining a pulsating motion of a patient separately from a determining of a respiratory motion; and

means for directing a radiosurgical beam, from a radiosurgical beam source, to a target in the patient based on the determining of the pulsating motion. (Emphasis added).

Mate is directed to a target locating and monitoring system that utilizes radio-frequency (RF) markers positionable in or near the target. An external excitation source that remotely excites the markers is used to produce an identifiable RF signal. Multiple RF sensors spaced apart in a known geometry relative to each other are used to detect the RF signal. (Mate, Abstract.) The RF markers of Mate move because of a combination of motions, such as contributions from breathing, organ filling or emptying, or other internal motions. (Mate, page 1, para. 10, page 2, para. 13). Using the RF sensor, the monitoring system of Mate detects only the resulting position of the RF markers caused by a combination of motions, such as breathing, organ filling or emptying, or other internal motions. (Mate, page 1, para. 10). In particular, the RF sensor used in the system of Mate cannot distinguish between movement of the RF markers due to the respiratory motion and movement of the markers due to cardiac motion. Nothing in Mate discloses that the different types of contributing motions are separately detected.

In contrast, claim 75 recites “means for determining a pulsating motion of a patient separately from a determining of a respiratory motion.” For the reasons stated above, Mate fails to disclose all of the limitations of claim 75. In particular, Mate does not disclose means for determining a pulsating motion of a patient separately from a determining of a respiratory motion. Moreover, the other cited references herein fail to cure the deficiencies noted above with respect to Mate. Given that the cited reference fails to disclose all of the limitations of the claim, Applicant respectfully submits that claim 75 is patentable over the cited reference.

Given that claims 76-78 depend from independent claim 75, which is patentable over the cited reference, Applicant respectfully submits that dependent claims 76-78 are also patentable over the cited reference.

CONCLUSION

It is respectfully submitted that in view of the amendments and remarks set forth herein, the rejections have been overcome. If the Examiner believes a telephone interview would expedite the prosecution of this application, the Examiner is invited to contact Daniel Ovanezian at (408) 720-8300.

If there are any additional charges, please charge them to Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: 3/6/06



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3/5

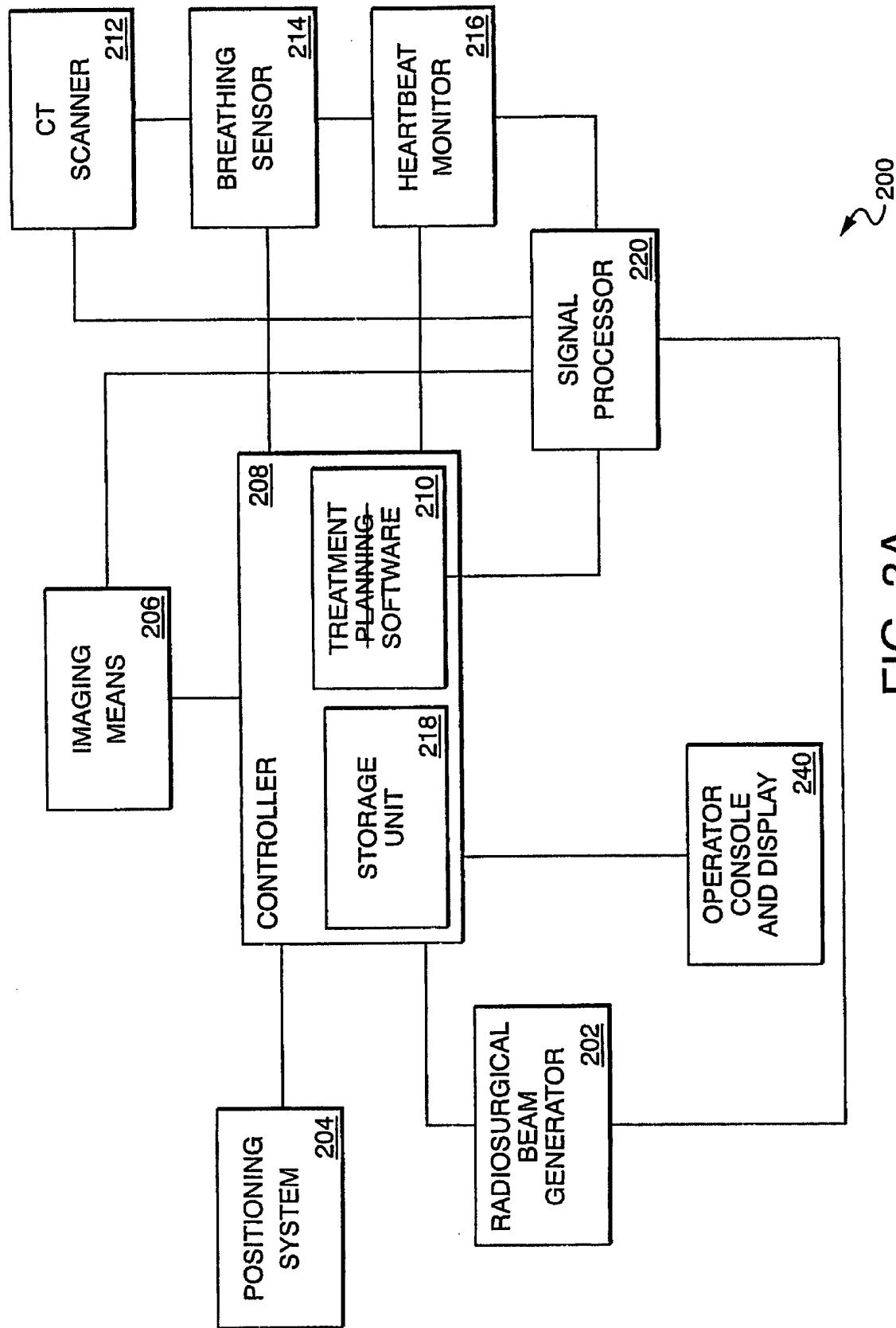


FIG. 3A

4/5

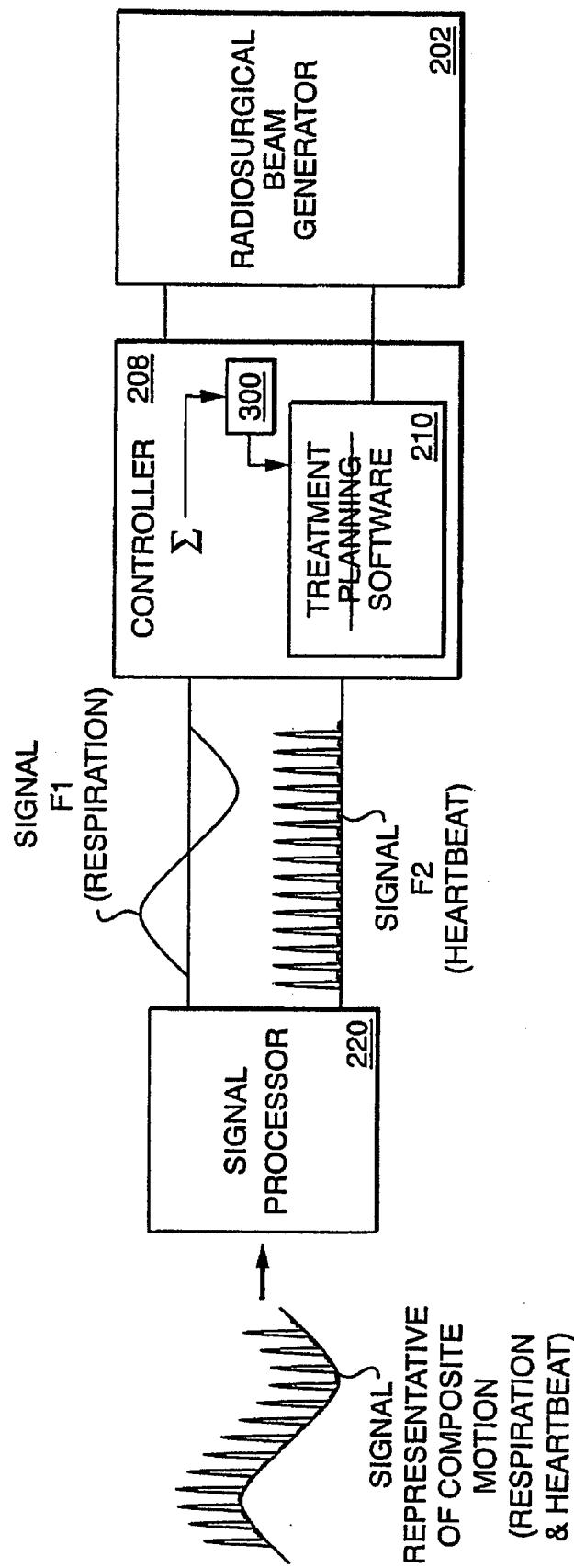


FIG. 3B